

## **THREE-DIMENSIONAL IMAGING DEVICE INCORPORATING STACKED LAYERS CONTAINING MICROELECTRONIC CIRCUITS**

### **Abstract of the Disclosure**

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A 3-D LADAR imaging system incorporating stacked microelectronic layers is provided. A light source is imaged upon a target through beam shaping optics. Photons reflected from the target are collected and imaged upon a detector array through collection optics. The detector array signals are fed into a multilayer processing module wherein each layer includes detector  
10 signal processing circuitry. The detector array signals are amplified, compared to a user-defined threshold, digitized and fed into a high speed FIFO range bin. Dependant on the value of the digit contained in the bins in the register, and the digit's bin location, the time of a photon reflection from a target surface can be determined. A  $T_0$  trigger signal defines the reflection time represented by each bin location by resetting appropriate circuitry to begin processing. The bin  
15 data representing the photon reflections from the various target surfaces are read out of the FIFO and processed using appropriate circuitry to create a 3-D point cloud for creating a 3-D target image.